WHAT IS CLAIMED IS:

1. A drilling system for drilling a wellbore, comprising

(a) a drill string having a drill bit at an end thereof;

(b) a source of drilling fluid supplying drilling fluid under pressure into the drill string (a "supply fluid"), the drilling fluid returning uphole via an annulus around the drill string (a "return fluid");

(c) an active pressure differential device ("APD Device") associated with the return fluid to create a pressure drop across said APD Device to reduce pressure in the wellbore downhole of said APD Device;

(d) a drive assembly coupled to said APD Device for energizing said APD Device; and

(e) a sealing member positioned between said APD Device and said drive assembly, said sealing member at least partially providing a barrier between the supply fluid and the return fluid.

2. The drilling system of claim 1 wherein said APD Device is selected from one of (a) a positive displacement pump, (b) a centrifugal type pump, and (c) a Moineau-type pump.

3. The drilling system of claim 1 wherein said drive assembly is selected from one of (a) a positive displacement drive, (b) a turbine drive, (c) a electric motor, (d) a hydraulic motor, (e) a Moineau-type motor, and (f) rotation of said drill string.

4. The drilling system of claim 1 further comprising a bypass for selectively diverting fluid around one of said APD device and said drive assembly.

5. The drilling system of claim 1 further comprising a speed converter interposed between drive assembly and said APD device, said speed converter

being adapted to convert a first speed associated with said drive assembly to a selected second speed associated with said APD device.

6. The drilling system of claim 5 wherein said speed converter is selected from a group consisting of (i) a gear drive, (ii) a hydrostatic drive, and (iii) a hydrodynamic drive.

7. The drilling system of claim 1 further comprising a comminution device positioned downhole of said APD device, said comminution device configured to reduce the size of cuttings entrained in the return fluid.

8. The drilling system of claim 7 wherein said comminution device includes a shaft coupled to a rotor associated with said APD Device and a conical head mounted on an end thereof, said shaft having a radial motion corresponding to an eccentric motion of said rotor, said conical head thereby engaging and reducing the size of the cuttings.

9. The drilling system of claim 1 wherein said APD Device comprises a centrifugal type pump and said comminution device comprises a shearing member configured as a stage in said centrifugal type pump.

10. The drilling system of claim 1 further comprising an annular seal disposed around said APD device, said annular seal causing the return fluid to flow into said APD device and allowing said APD device to create a differential pressure thereacross.

11. The drilling system of claim 1 further comprising a controller that controls the operation of said APD Device.

12. The drilling system of claim 11 wherein said controller is located at one of: (i) at the surface; (ii) in a drilling assembly attached to the drill string; and (iii) adjacent said APD Device.

13. The drilling system of claim 11 wherein said controller controls said APD Device in response to one of: (i) a parameter of interest; (ii) programmed instructions provided to said controller; (iii) instructions from a remote location; and (iv) a downhole measured parameter.

14. The drilling system of claim 11 wherein said controller includes one of (a) microprocessor and a memory, and (b) a hydro-mechanical device.

15. The drilling system of claim 11 wherein said controller is positioned in the wellbore; and further comprises a telemetry system for transmitting signals to said controller.

16. The drilling system of claim 11 wherein said controller controls the operation of said APD Device to control the pressure in the wellbore to one of: (i) maintain the wellbore bottomhole pressure at a predetermined value; (ii) maintain the wellbore bottomhole pressure within a selected range; (iii) maintain at-balance condition; and (iv) maintain under-balance condition.

17. The drilling system of claim 1 further comprising a sensor for detecting a parameter of interest.

18. The drilling system of claim 17 wherein said sensor detects a parameter selected from a group consisting of (i) drilling parameters, (ii) drilling assembly parameters, and (iii) formation evaluation parameters.

19. The drilling system of claim 17 wherein said sensor is positioned at a predetermined location selected from a group consisting of (i) a surface location,

(ii) at said APD Device, (iii) at wellhead equipment, (iv) in the supply fluid, (v) along said drill string, (vi) at a drilling assembly connected to said drill string, (vii) in the return fluid upstream of said APD device, and (viii) in the return fluid downstream of said APD device.

20. The drilling system of claim 1 further comprising a blocking device downhole of said APD Device that blocks the return fluid flow when the drilling fluid supply is interrupted or stopped.

21. The drilling system of claim 1 wherein said APD device is attached to one of (a) said drill string, (b) a location stationary relative to said drill string, (c) the annulus, and (d) a riser.

22. A drilling system for drilling a wellbore, comprising

(a) a drill string having a drill bit at an end thereof;

(b) a source of drilling fluid supplying drilling fluid under pressure into the drill string (a "supply fluid"), said drilling fluid returning uphole via an annulus around the drill string (a "return fluid");

(c) an active pressure differential device ("APD Device") placed in the annulus to create a pressure drop across said APD Device to reduce pressure in the wellbore downhole of said APD Device, said APD Device in fluid communication with the return fluid; and

(d) an electric drive assembly being substantially isolated from the supply fluid.

23. The drilling system of claim 22 wherein said electric drive assembly is disposed in a location selected from (a) in housing that substantially isolates said electric drive assembly from the supply fluid, and (b) on the outside of said drill string.

24. The drilling system of claim 22 further comprising a speed converter interposed between said drive assembly and said APD device, said speed converter adapted to convert a first speed associated with said drive assembly to a selected second speed associated with said APD device.

25. The drilling system of claim 24 wherein said speed converter is selected from a group consisting of (i) a gear drive, (ii) a hydrodynamic drive, and (iii) a hydrodynamic drive.

26. The drilling system of claim 22 further comprising a comminution device positioned downhole of said APD device, said comminution device configured to reduce the size of particles entrained in said drilling fluid.

27. The drilling system of claim 26 wherein said comminution device is coupled to said drive assembly and energized thereby.

28. The drilling system of claim 26 wherein said comminution device comprises a shearing member configured as a stage in a centrifugal type pump associated with said APD Device.

29. The drilling system of claim 22 further comprising an annular seal disposed around said APD device, said annular seal causing drilling fluid to flow into said APD device.

30. The drilling system of claim 22 wherein said APD Device includes one of: (i) a turbine; and (ii) a centrifugal pump.

31. A method for drilling a wellbore, comprising

(a) providing a drill string having a drill bit at an end thereof;

(b) supplying drilling fluid under pressure into the drill string (a "supply fluid"), the drilling fluid returning uphole via an annulus around the drill string (a "return fluid");

(c) positioning an active pressure differential device ("APD Device") in fluid communication with the return fluid to create a pressure drop across the APD Device to reduce pressure in the wellbore downhole of the APD Device;

(d) coupling a drive assembly to the APD Device for energizing said APD Device; and

(e) providing an at least partial barrier between the supply fluid and the return fluid by positioning a sealing member positioned between the APD Device and the drive assembly.

32. The method of claim 31 wherein said APD Device is selected from one of (a) a positive displacement pump, (b) a centrifugal type pump, and (c) a Moineau-type pump.

33. The method of claim 31 wherein said drive assembly is operated by one of (a) a positive displacement drive, (b) a turbine drive, (c) a electric motor, (d) a hydraulic motor, (e) a Moineau-type pump, and (f) rotation of the drill string.

34. The method of claim 31 further comprising positioning a comminution device downhole of the APD device, the comminution device configured to reduce the size of cuttings entrained in the return fluid.

35. The method of claim 34 wherein the comminution device includes a shaft coupled to a rotor associated with the APD Device and a conical head mounted on an end thereof, the shaft having a radial motion corresponding to an eccentric motion of the rotor, the conical head thereby engaging and reducing the size of the cuttings.

36. The method of claim 34 wherein the APD Device comprises a centrifugal type pump and the comminution device comprises a shearing member configured as a stage in the centrifugal type pump.

37. The method of claim 31 further comprising disposing an annular seal around the APD device, the annular seal causing the return fluid to flow into the APD device and allowing the APD device to create a differential pressure.

38. The method of claim 31 further comprising controlling the operation of the APD Device with a controller.

39. The method of claim 38 further comprising positioning the controller at one of: (i) at the surface; (ii) in a drilling assembly attached to the drill string; and (iii) adjacent the APD Device.

40. The method of claim 38 wherein the controller controls the APD Device in response to of: (i) a parameter of interest; (ii) programmed instructions provided to the APD Device; (iii) instructions provided to the APD Device from a remote location; and (iv) a downhole detected parameter.

41. The method of claim 38 further comprising positioning the controller in the wellbore; and transmitting signals to the controller via a telemetry system.

42. The method of claim 38 wherein the controller controls the operation of the APD Device to control the pressure in the wellbore to one of: (i) maintain the wellbore bottomhole pressure at a predetermined value; (ii) maintain the wellbore bottomhole pressure within a selected range; (iii) maintain at-balance condition; and (iv) maintain under-balance condition.

43. The method of claim 31 further comprising detecting a parameter of interest with a sensor.

44. The method of claim 43 wherein the sensor detects a parameter selected from a group consisting of (i) drilling parameters, (ii) drilling assembly parameters, and (iii) formation evaluation parameters.

45. The method of claim 43 further comprising positioning the sensor at a predetermined location selected from a group consisting of (i) a surface location, (ii) at the APD Device, (iii) at wellhead equipment, (iv) in the supply fluid, (v) along the drill string, (vi) at a drilling assembly connected to the drill string, (vii) in the return fluid upstream of the APD device, and (viii) in the return fluid downstream of the APD device.

46. The method of claim 31 further comprising attaching the APD device to one of (a) the drill string, (b) a location stationary relative to the drill string, (c) the annulus, and (d) a riser.

47. A method for drilling a wellbore, comprising

(a) providing a drill string having a drill bit at an end thereof;

(b) supplying drilling fluid under pressure into the drill string (a "supply fluid"), the drilling fluid returning uphole via an annulus around the drill string (a "return fluid");

(c) placing an active pressure differential device ("APD Device") in the annulus to create a pressure drop across the APD Device to reduce pressure in the wellbore downhole of the APD Device, the APD Device in fluid communication with the return fluid; and

(d) driving the APD device with an electric drive assembly that is substantially isolated from the supply fluid.

48. The method of claim 47 further comprising disposing the electric drive assembly in a location selected from (a) in housing that substantially isolates the electric drive assembly from the supply fluid, and (b) on the outside of the drill string.

49. The method of claim 47 further comprising positioning a comminution device downhole of the APD device, the comminution device configured to reduce the size of particles entrained in the return fluid.

50. The method of claim 47 further comprising disposing an annular seal around the APD device, the annular seal causing drilling fluid to flow into the APD device and providing a pressure differential across the APD device.

51. The method of claim 47 wherein said APD Device includes one of: (i) a turbine; and (ii) a centrifugal pump.